

Glossary



Special Characters

.bashrc file A file in your home directory that you can use to customize your work environment and specify what occurs each time you **log on**. It contains a .bashrc program that executes each time you create a shell.

/home partition The home directory that provides storage space for all users' directories. A separate section of the hard disk, it protects and insulates users' personal files from the UNIX operating system software.

/usr partition A large section of the hard disk that stores all non-**kernel** operating system programs that make the computer useful: software development packages, networking, Internet access, graphical screen (including X-Windows), and a large number of UNIX **utilities**.

A

absolute path A **pathname** that begins at the **root directory** and lists all **subdirectories** to the destination file.

address An exact location in a file or in memory.

algorithm A sequence of instruction or commands that produce a desirable result. You develop an algorithm by following the logic flow expressed in flowcharts and pseudocode.

alias A name that represents a command. Aliases are helpful in simplifying and automating frequently used commands.

applet A small software application, usually written in JAVA or some other programming language for the Web. The **GNOME** pager is an applet designed to run on the GNOME panel.

argument Provides UNIX and other operating systems with additional information for executing a command. On the **command line**, an argument name follows an **option** name, and a space separates the two. Examples of arguments are file and directory names.

arithmetic operator A character that represents a mathematical activity. Arithmetic operators include + (addition), - (subtraction), * (multiplication), / (division), > (greater than), < (less than), and a number of other characters.

array A variable that stores an ordered list of **scalar** values that are accessed with numeric subscripts, starting as zero.

ASCII An acronym for American Standard Code for Information Interchange, a standard set of bit patterns organized and interpreted as alphabetic characters, decimal numbers, punctuation marks, and special characters. The code is used to translate **binary numbers** into ordinary language and therefore makes information stored in files accessible.

assembler Called by the **compiler** to convert the lines of code in a **source file** into **object code**.

assembly language A low-level language that provides maximum access to all the computer's devices, both internal and external. Writing an assembly language program requires a great deal of coding and time. UNIX was originally written in assembly language.

automatic variable A **variable** declared inside a function and local to the function in which it is declared.

Awk A pattern-scanning and processing language that helps to produce professional-looking reports.

B

B A forerunner of **C**, this programming language was developed in 1970 for the first UNIX system to run on the DEC PDP-7 mini-computer. Its developer is Ken Thompson, a Bell Labs employee.

backquote (') operator Encloses UNIX commands whose output becomes the contents of a variable. For example, `TODAY='date'` creates the variable `TODAY`, executes the `date` command, and stores the command's output in the `TODAY` variable.

Bash shell LINUX's default command interpreter. Incorporating the best features of the **Bourne shell** and the **Korn shell**, its name is an acronym for "Bourne Again Shell."

binaries The programs residing in the `/bin` directory that are needed to start the system and perform other essential tasks. Also called executables.

binary digit A number composed of two numbers, 0 and 1. UNIX stores all data in the form of binary digits. Because the com-

puter consists of electronic circuits in either an "on" or "off" state, binary digits are perfect for representing these states. Binary digits are also called bits.

binary file A file containing non-ASCII characters (such as machine instructions).

bit A short term for **binary digit**.

bitmap Rows and columns of dots or bit patterns that graphics software transforms into an infinite variety of images. *See also* **GUI**.

block special file A file related to devices, such as disks.

body One of two parts of **HTML** code. (The other part is the **head**.) The body defines what appears within the browser window.

bootstrap loader A utility residing in the `/boot` directory that starts the operating system.

Bourne shell The first UNIX command interpreter, developed at AT&T Bell Laboratories by Steve Bourne.

byte An acronym for binary term, a string of eight binary numbers. These numbers can be configured into patterns of **bits**, which in turn can be interpreted as alphabetic characters, decimal numbers, punctuation marks, and special characters. This is the basis for **ASCII** code.

C

C A programming language developed in part to overcome the disadvantages of **assembly language** programming, which requires a great deal of coding and time. The result is a high-level set of easy-to-understand instructions. UNIX was originally written in assembly language but further developed and refined in **C**, largely due to the efforts of Ritchie and Brian Kernighan of Bell Labs.

- C++** A programming language developed by Bjarne Stroustrup of AT&T Bell Labs, who added **object**-oriented capabilities and other features to the **C** language.
- C library** A collection of **functions** that perform file, screen, and keyboard operations, and many other tasks. To perform or include one of these functions in your program, you insert a **function call** at the appropriate location in your file.
- C shell** A UNIX command interpreter designed for C programmers.
- case logic** One of the four basic shell logic structures necessary for program development. Using case logic, a program can perform one of many actions, depending on the value of a variable and matching results to a test.
- case-sensitive** A property that distinguishes uppercase letters from lowercase letters (John differs from john). UNIX is case sensitive.
- CC** The **C compiler's name** in UNIX and Linux.
- CGI programming** An acronym for **Common Gateway Interface programming**.
- character special file** A file related to serial input/output devices, such as printers.
- child** A subdirectory created and stored within a **(parent) directory**.
- clients** Computers in a network running programs that depend on the network's **server** or host computer.
- code** A synonym for "binary term" or "**byte**," most often used in the context of **ASCII** codes.
- command** Text typed after the **command-line** prompt that requests that the computer take a specific action.
- command line** The on-screen location for typing commands.
- command mode** A feature of a modal editor that lets you enter commands to perform editing tasks, such as moving through the file and deleting text. The UNIX vi editor is a modal editor.
- Common Gateway Interface programming** A **protocol** or set of rules governing how browsers and servers communicate. Any script that sends information to or receives information from a server must follow these rules.
- compiler** A program that reads the lines of code in a **source file**, converts them to **machine-language** instructions or calls the assembler to convert them into **object code**, and creates a machine-language file.
- concatenate** To link. For example, by typing the cat command and then typing several filenames separated by single spaces, you can display the contents of all the files.
- configuration variable** A **variable** that stores information about the operating system and does not change value.
- console** The monitor connected directly to a computer.
- constant** A value in program code that does not change when the program runs.
- control string** Specifies how formatting should occur when using the screen output library function printf.
- core file** A type of **garbage file** created when an executing program attempts to do something illegal, such as accessing another user's memory.

D

decision logic One of the four basic shell logic structures necessary for program development. Decision logic states that commands execute only if a certain condition exists. In this type of logic the if statement sets the condition(s) for execution.

decrement operator (--) A **C arithmetic operator** that decreases the value of a variable by a specified amount.

default prompt The prompt the system generated when the **system administrator** created a login account.

dependent file A **source code** file listed within **Makefile**.

diamond operator (<>) Accesses data from an open file. Each time the diamond operator is used, it returns the next line from the file.

directory A special type of **file** that can contain other files and directories. Directory files store the names of regular files and other directories, called **subdirectories**.

domain name A set of characters separated by periods and used to identify and access remote systems. An example is (Lunar.campus.edu).

dot A character that signifies the current **directory**. Two dot characters (with no space between them) signify the **root directory**. A dot used as the first character of the filename indicates the file is **hidden**.

E

editor A program for creating and modifying computer documents, such as program and data files.

electronic interfaces The means for connecting **peripherals** to computers.

environment variable A **variable** that UNIX reads when you **log on**, which stores information about the characteristics of your work session. For example, the PS1 environment variable determines how your prompt appears. Other environment variables tell UNIX where to look for programs, which **shell** to use, and the path to your home directory. You can change the value of an environment variable as needed.

equal sign (=) operator Sets a value in a variable.

executable file A useable program, the result of the program development cycle.

executable program file A file containing pure binary or machine language that the computer can immediately use or execute.

executables The programs residing in the /bin directory needed to start the system and perform other essential tasks. Also called binaries.

F

false value A value returned from a program function indicating that the function was not carried out successfully. A 0 represents a false value.

file The basic component for data storage.

file decryption An operation that restores a file to the state it was in before **file encryption**.

file encryption An operation that scrambles a file's contents into secret code and is a useful security measure.

File Manager A graphical application for managing directories and files and for navigating the file system.

file system A system's way of organizing

files on mass storage devices, such as hard and floppy disks. Its organization is hierarchical and resembles an inverted tree: in the branching structure, top-level files (or folders or directories) contain other files, which in turn contain other files.

File Transfer Protocol (FTP) An Internet protocol for sending files.

filehandle An input/output connection between a Perl program and the operating system. It can be used inside a program to open, read, write, and close the file.

flat ASCII file A file that you can create, manipulate, and use to store data such as letters, product reports, or vendor records. Its organization as an unstructured sequence of bytes is typical of a **text file** and lends flexibility in data entry because it can store any kind of data in any order. Any operating system can read this file type. However, because you can retrieve data only in the order you entered it, this file type's usefulness is limited. Also called an **ordinary file** or **regular file**.

flowchart A logic diagram that uses a set of standard symbols to explain a program's sequence and each action it takes.

FORM tag In **HTML** specifies how you wish to receive information users entered as responses to your document. You can choose one of two methods: **GET** or **POST**.

FTP An acronym for **File Transfer Protocol**.

function A separate body of code designed to contribute to the execution of a single task. You can put together a number of functions to create a program. In some languages, functions are called subroutines or procedures.

function call A feature that you insert in the appropriate location of a program file to specify and use one of the functions in the **C library**.

function overloading A feature of the **C++** programming language that lets functions respond to more than one set of criteria and conditions.

G

g++ The **C compiler's name** in UNIX and Linux.

garbage file A temporary file, such as a **core file**, that loses its usefulness after several days.

GET A method for receiving information users entered as responses to your **HTML** document. It transfers data within the URL itself.

glob Similar to a **wildcard**, a glob character is used to find or match filenames. Glob characters are part of **glob patterns**.

glob pattern A combination of **glob** characters used to find or match multiple filenames.

GNOME An acronym for the **GNU Network Object Model Environment**.

GNU Network Object Model Environment (GNOME) Produced by the **GNU project**, GNOME is a desktop environment that must be used with a Windows Manager.

GNU project An organization created to develop a free, UNIX-like, operating system named GNU.

Graphical User Interface Software that transforms **bitmaps** into an infinite variety of images.

group id Gives a group of users equal access to files that they all share.

GUI An acronym for Graphical User Interface.

H

hash A variable representing a set of key value pairs. A percent sign (%) precedes a hash variable.

head One of two parts of **HTML** code. (The other part is **body**.) The head contains the title, which appears on the top bar of your browser window.

header file A file containing the information the compiler needs to process standard input or output statements.

hidden file A file that the operating system uses to keep configuration information and for other purposes. The name of a hidden file begins with a dot.

high-level language A computer language that uses English-like expressions. COBOL, C, and C++ are high-level languages.

host *See* **server**.

HTML An acronym for **Hyper Text Markup Language**.

Hyper Text Markup Language A format for creating documents and Web pages with embedded codes known as **tags**.

hyperlink Text or an object in a Web document. When you click a hyperlink, another document loads and appears in the browser.

I

IDE Integrated drive electronics, the most popular electronic hard disk interface for **personal computers**.

increment operator (++) A **C arithmetic operator** that increases the value of a variable by a specified amount.

inline sort block A compact Perl notation that replaces an if-else statement and eliminates the need for a separate subroutine.

input validation A process a program performs to ensure that the user has entered acceptable information.

insert mode A feature of a modal editor that lets you enter text. The UNIX vi editor is a modal editor.

Internet Protocol (IP) address A set of four numbers separated by periods (123.456.678.90) used to identify and access remote systems.

interpreter A UNIX feature that reads statements in a program file, immediately translates them into executable instructions, and then runs the instructions. Unlike a **compiler**, an interpreter does not produce an executable file because it translates the instructions and runs them a single step.

IP An acronym for **Internet Protocol**.

K

kernel The basic operating system, which interacts directly with the hardware and services user programs.

kernel mode A means of accessing the **kernel**. Its use is limited to the **system administrator** to prevent unauthorized data from damaging the hardware that supports the entire UNIX structure.

key words Components of all programming languages, these words have special meaning and must not be used as variable or function names. *See* Table 10-1 for a list of C key words.

Korn shell A UNIX command interpreter that offers more features than the original **Bourne shell**. David Korn developed it at AT&T Bell Laboratories.

L

layering A method of organizing software so that it surrounds the computer system's inner core, protecting its vital hardware and software and insulating the core and its users.

line editor An editor that lets you work with only one line or a group of lines at once. Although you cannot see the context of your file, you may find a line editor useful for tasks like searching, replacing, and copying blocks of text.

line-oriented command A command that can perform more than one action, such as searching and replacing, in more than one place in a file. When using a line-oriented command, you must specify the exact location where the action is to occur. These commands differ from screen-oriented commands, which execute relative to the location of the cursor.

link A means of joining multiple files that share a common field.

linker In program development, used after the **compiler** to link all object files that belong to the program and any library programs the program may use.

localhost A feature that helps you experiment with and test **HTML** documents, or Web pages, using a UNIX or Linux system. To use localhost, you need not be connected to the Internet. Located on your PC, localhost also assesses your

PC's internal network configuration to ensure it's properly installed.

log on A process that protects privacy and safeguards a **multi-user system** by requiring each user to type a user name and password before using the system.

log out A process that tells a system that a user has finished using it. Commands for logging out vary from system to system; exit, CTRL+D, and logout are examples.

logical structure The organization of information in files, records, and fields, each of which represents a logical entity such as a payroll file, an employee's pay record, or an employee social security number.

looping logic One of the four basic shell logic structures necessary for program development. In looping logic a control structure (or loop) repeats until some condition exists or some action occurs.

M

machine language The exclusive use of 0s (which mean "off") and 1s (which mean "on") to communicate with the computer. Years ago, programmers had to write programs in machine language, a tedious and time-consuming process.

macro A set of commands that automates a complex task. A macro is sometimes called a super instruction.

mainframe system A large computer system with multiple processors that conducts input, output, processing, and storage operations for many users. Most widely used in large corporations and industrial computing.

make utility A UNIX utility that controls changes and additions to programs during program development. It tracks what needs to be recompiled using the time stamp file stored in all source files.

Makefile A control file you create and the **make utility** uses. The file includes a list of all your source files and their relationship to each other, expressed as **targets** and **dependencies**.

manipulation and transformation commands A group of commands that alter and format extracted information so that it's useful and appealing.

methods Part of the new data class, objects, introduced in the **C++** programming language. Methods are a set of operations that manipulate data.

modal editor An editor that lets you work in two modes: **insert mode** and **command mode**. The UNIX vi editor is a modal editor.

mount To connect a file system to the directory tree structure, making it accessible.

Multipurpose Internet Mail Extensions (MIME) A communications **utility** that supports sending and receiving **binary files** in mail messages.

multitasking system A system that lets a user work with more than one program at a time. UNIX is a multitasking system.

multi-user system A system in which many people can simultaneously access and share a **server** computer's resources. To protect privacy and safeguard the system, each user must type a user name and password in order to use, or **log on** to, the system. UNIX is a multi-user system.

N

network A group of computers wired together to let many users share computer resources and files. Combines the convenience and familiarity of the personal computer with the processing power of a mainframe.

network operating system Controls the operations of a **server** or host computer, which accepts and responds to requests from user programs running on other computers on the network called **clients**.

null character A single byte whose bits are all set to zero.

O

object code Binary instructions translated from program source code by a compiler.

objects A new data class introduced in the **C++** programming language. Objects are a collection of data and a set of operations called **methods** that manipulate data.

operand The variable name that appears to the left of an operator or the variable value that appears to the right of an operator. For example, in NAME=Becky, NAME is the variable name, = is the operator, and Becky is the variable value. Note that no spaces separate the operator and operands.

option Directs UNIX and other operating systems to execute a command in a specific way. On the **command line**, an option name follows a command name, and a space separates the two. In UNIX option names begin with a hyphen and are **case sensitive**.

ordinary files Files that you can create and manipulate. Includes **ASCII** files and **binary files**. Also called **regular files** or **flat ASCII files**.

ordinary users All persons who use the system, except the **system administrator** or superuser.

P

parent The **directory** in which a **subdirectory (child)** is created and stored.

partition A separate section of a disk, created so activity and problems occurring in other partitions do not affect it.

PATH variable Identifies a path and provides a list of directory locations where UNIX looks for executable programs.

pathname A means of specifying a file or directory that includes the names of **directories** and **subdirectories** on the branches of the tree-structure. A forward slash (/) separates each directory name. For example, the pathname of the file phones (the destination file) in the source directory of Jean's directory within the /home directory is
/home/jean/source/phones.

PC An acronym for **personal computer**.

peer-to-peer network A networking configuration in which each computer system on the network is both a **client** and a **server**. Data and programs reside on individual systems, so users do not depend on a central server. The advantage of a peer-to-peer network is that if one computer fails, the others continue to operate.

peripherals Equipment connected to a computer via **electronic interfaces**. Examples include hard and floppy disk drives, printers, and keyboards.

Perl An acronym for Practical Extraction and Report Language, a UNIX programming language similar to C that uses features from the Awk and shell programs. Created by Larry Wall in 1986 as a simple report generator, Perl has evolved to become a powerful and popular tool for creating interactive Web pages.

personal computer A single, standalone machine, like a desktop or laptop computer, that performs all input, output, processing, and storage operations.

portability A characteristic of an operating system that allows the system to be used in a number of different environments. UNIX is a portable operating system.

POST A method for receiving information users entered as responses to your **HTML** document. It uses the body of the HTTP request to transfer data.

preprocessor Used after initial application development and before the compiler to make necessary modifications to the program and to include the contents of other files.

preprocessor directive A statement that you place in your program to instruct the **preprocessor** to modify your source code in some way. A preprocessor directive always begins with the # symbol. An example is #include, which tells the preprocessor to include another file in your program.

process To receive data from the standard input device (your keyboard) and then send output to the standard output device (your monitor).

program development cycle The process of developing a program, which includes (1) creating program specification, (2) the design process, (3) writing code, (4) testing, (5) debugging, and (6) correcting errors.

protocol A set of rules governing communication and the transfer of data between computers.

prototype A running model, which lets programmers review a program before committing to its design.

pseudocode Instructions similar to actual programming statements. Used to create a model that may later become the basis for an actual program.

R

record layout The first task in the process of designing a new program, in which each field is named and identified by data type (for example, numeric or non-numeric).

redirection symbol The greater than sign (>). Typing > after a command that produces output creates a new file or overwrites an existing file and then sends output to a disk file, rather than the monitor.

regular files Files that you can create and manipulate. Includes **ASCII** files and **binary files**. Also called **ordinary files** or **flat ASCII files**.

relational database Contains files that UNIX treats as tables, records that UNIX treats as rows, and fields that UNIX treats as columns that can be joined to create new records. Using the join command, you can extract information from two files in a relational database that share a common field.

relative path A **pathname** that begins at the current working **directory** and lists all **subdirectories** to the destination file.

RGB color code A set of three numbers that specify a colors red, green, and blue components.

root The basis of the tree-like structure of the **file system** and the name of the file (root directory) located at this level. (The slash character (/) denotes this file.) Also, the **system administrator's** unique user name, a reference to the system adminis-

trator's ownership of the root account and unlimited system privileges.

root device The hard disk partition that houses the UNIX root file system.

root directory The most basic file in the tree-like structure of the **file system**. (The slash character (/) denotes this file.)

S

scalar A simple variable that holds a number or a string. Scalar variables' names begin with a dollar sign (\$).

scope The part of the program where a **variable** is defined and accessible. The scope can be either inside or outside of a **function**.

screen editor An editor supplied by the operating system that displays text one screen at a time and lets you move around the screen to add and change text. UNIX has two screen editors: vi and Emacs.

screen-oriented command A command that executes relative to the position of the cursor. Screen-oriented commands are easy to type, and you can readily see their result on the screen. These commands differ from line-oriented commands, which execute independently of the location of the cursor.

SCSI Small computer system interfaces, pronounced *scuzzy*, a popular electronic hard disk interface commonly used on local-network **servers**.

sed A powerful UNIX editor used to make global changes to large files.

sequential logic One of four basic shell logic structures necessary for program development. Sequential logic states that commands execute in the order they

appear in the program. An exception occurs when a branch instruction changes the flow of execution.

server The computer that houses the **network operating system** and, as a result, can accept and respond to requests from user programs running on other computers in the **network** called **clients**. Also called the host.

server-based network A centralized approach to networking, in which all **client** computers' data and programs reside on the **server**.

shared library images Files residing in the `/lib` directory that programmers use to share code, rather than copying this code into their programs. Doing so makes their programs smaller and faster.

shell A required interface between the user and the UNIX operating system. It interprets commands entered from the keyboard.

shell function A group of commands stored in memory and assigned a name. Shell functions simplify the program code. For example, you can include a function's name within a shell script so the function's commands execute as part of the script. You can also use shell functions to store reusable code sections, so that you do not need to duplicate them.

shell script file A file type based on the UNIX command-line history feature that recalls and reexecutes the commands you enter. The file contains command-line entries that you and others can repeatedly access and run sequentially as a set. Similar to an MS-DOS batch file.

shell variable A variable you create at the command line or in a shell script. Valuable for use in **shell scripts** for storing information temporarily.

source file A file containing source code, created with an editor like vi or Emacs and used for storing a program's high-level language statements. To execute, a source file must be converted to a low-level machine language file consisting of **object code**.

spaceship operator `<=>` A special Perl operator for numeric sorts that reduces coding requirements.

standard error A type of output that results when UNIX detects errors in processing system tasks and user programs and sends the error to the screen by default.

standard error (stderr) A type of output that results when UNIX detects errors in processing systems tasks and user programs and sends the error to the screen by default.

standard input Data received from the standard input device (the keyboard).

standard output Data sent to the standard output device (the monitor).

status line File status information that appears at the bottom of the screen. The vi editor's status line provides information on patterns you are searching for, line-oriented commands, and error messages.

stderr An acronym for **standard error**.

stdin An acronym for **standard input**.

stdout An acronym for **standard output**.

string A non-numeric field of information treated simply as a group of characters. Numbers in a string are considered characters rather than digits.

subdirectory A **directory** created and stored within another directory. The subdirectory is considered the **child** of the **parent** directory.

superuser *See* **system administrator**.

swap partition A section of the hard disk, separated from other sections so that it functions as an extension of memory; that is, it supports **virtual memory**. A computer system can use the space in this partition to swap information between disk and RAM so the computer runs faster and more efficiently.

symbolic link A name that points to and provides access to a file located in another directory. Many files in the /lib directory are symbolic links to files in system libraries. A 1 to the left of a filename in a long directory listing identifies a symbolic link file.

syntax A command's format, wording, options and arguments.

syntax error A grammatical mistake in **machine-language** usage in a **source file**. Such mistakes prevent the compiler from converting the file into an executable file.

system administrator The person who manages the system and is responsible for adding new users, granting privileges to **ordinary users**, deleting old accounts, and ensuring that the system performs efficiently. Having unlimited permission to alter the system, the system administrator is also called the superuser.

T

tags Code embedded in a document or Web page created with **Hyper Text Markup Language (HTML)**. When the document is viewed with a Web browser like Netscape Navigator or Internet Explorer, the tags give the document special properties like foreground and

background colors, font size, and the placement of graphical elements. You can also use tags to place **hyperlinks** in a document.

target file A file listed within **Makefile**. It depends on another file to determine if the **make utility** needs to take action to rebuild the target file.

tcsh A free, shareware UNIX command interpreter based on the **C shell**.

Telnet An Internet terminal emulation program.

text editor A simplified word processor used to create and edit documents but has no formatting features for boldfacing and centering text, for example.

text file Computer file composed entirely of ASCII characters.

translate utility A utility that changes the **standard input** (characters you type on the keyboard) character by character.

true value A value returned from a program function indicating that the function was carried out successfully. A 1 usually represents a true value, but sometimes any non-zero value represents a true value.

user mode A means of accessing the areas of a system where all program software resides.

U

utility A program that performs useful operations like copying files, listing directories, and communicating with other users. Unlike other operating system programs, a utility is an "add-on" and not part of the UNIX shell, nor a component of the kernel.

V

variables Symbolic names that represent values stored in memory.

virtual file system A system that occupies no disk space, such as the `/proc` directory. The system references and lets you obtain information about which programs and processes are running on a computer.

virtual memory An unlimited memory resource supported by the **swap partition**, where the system can swap information between disk and RAM, allowing the computer to run faster and more efficiently.

W

wallpaper A graphic image you can choose to use as the background of your desktop area.

wildcard A special character used to represent any other character or, sometimes, a group of characters. Wildcards help

you work with files whose names are similar or find a file whose exact name you cannot remember. Wildcard characters are also called **glob** characters.

Windows Manager The top layer of the X Window system and the user's interface to the system's components. It controls how windows appear and how users control them.

X

X Window system A **graphical user interface** (GUI) that runs on Linux and many UNIX operating systems.

X11 The eleventh version of the X Window system.

Xfree86 A version of **X11** that was ported to the PC and on Linux.

zsh A free, shareware UNIX command interpreter based on the **Korn shell**.